



Early Site-Level Lessons in Brownfield BEV Implementation

Objective

To integrate BEVs into underground operations in a way that upholds safety, maintains equipment reliability, and supports long-term operational flexibility. This required developing in-house capabilities, adapting to equipment and infrastructure constraints, and navigating the steep learning curve that comes with early-stage adoption—while remaining aligned with corporate ESG commitments and regulatory expectations.

Key Points & Lessons Learned

Start internal training early and progressively.

“We’re trying to put in place mandatory training—safety awareness first, then hands-on, then full diagnostics.”

Don’t assume OEMs are ready with complete training or documentation.

“At first, we didn’t have a training program. We built it in-house—using input from other sites, conferences, and the OEM—but it took pressure and persistence to pull it together.”

Reliability improves over time, but early adopters must manage risk.

“Getting early adoption of this technology means you’re working with a product that’s not 100% mature. That’s just the reality.”

Battery performance and autonomy have generally met expectations.

“We didn’t have big issues with batteries. They’ve been quite reliable.”

Plan with equipment providers for the integration into brownfield electrical networks.

“We said: are you selling only to new mines, or do you want your machines to work in 30-year-old mines too?”

Engage OEMs early on infrastructure compatibility.

“We didn’t want to change the whole electrical system for 50 years just to match one charger. So the OEM worked with us on a solution at the machine level.”

Design issues can introduce unexpected safety risks if not well understood.

“If your battery is fully charged and you go downhill, your dynamic braking disables—that’s a big safety issue.”

Corporate support evolves with experience; early lessons shape future direction.

“There’s not yet a clear corporate vision like ‘let’s go BEVs’. We’re all still in learning mode.”

Progress to Date

Since the first BEVs introduced in 2022, both operational and technical maturity have significantly advanced. In-house training programs have been established for operators, mechanics, and electricians, supported by lessons from industry peers and persistent collaboration with OEMs. Safety protocols are now in place for battery-related incidents, and technical staff are equipped to respond to and learn from system faults.

Initial issues with charger compatibility and equipment integration into legacy power networks have largely been addressed through on-machine filtration and adjusted design specifications. Battery reliability and autonomy have proven consistent with expectations, and frontline teams are increasingly confident in their ability to manage BEVs independently.